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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/726,338	ZAMAN ET AL.
	Examiner	Art Unit
	Michael D. Pham	2167

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/01/2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

1. Claims 1 - 34 have been examined.

2. Claims 1 - 34 are pending;

3. Claims 1- 34 are rejected as detailed below.

Priority

No foreign and domestic priority has been claimed. Accordingly, the application has been examined with the effective filing date of 12/01/2003.

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they **do not include** the following reference sign(s) mentioned in the description: 510. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they **include** the following reference character(s) not mentioned in the description: 1115. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 1, 3, 19, and 21 objected to because of the following informalities: appears that a semicolon is present where a colon is needed. Appropriate correction is required.

Claim 31 is objected to because of the following minor informality: claim 31 appears to recite "Submitting the a native relational database" it appears that it was a typo and that "Submitting the native relational database" was meant. Appropriate action is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 31 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 31 recites the limitation "the a relational database query" in the third limitation of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 6-7, 8, 10, 15, 17-18, 19-30 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 by Soylemez et. al. (hereafter Soylemez).

<u>**Claim 1:**</u>

As to claim 1, Solyemez discloses, **a method in a computing system for processing a relational database query comprising;**

Receiving the relational database query [0018, Techniques are provided for efficiently accessing multidimensional data using relational database statements, such as SQL commands. The multidimensional data is stored according to a multidimensional schema that is accessible to a multidimensional database server. To access the data, a relational database statement is submitted to a relational database server.];

Constructing a multidimensional database query based on the received relational database query [0025, these techniques can be employed, generally, to extract multidimensional data from the relational database for presentation to a relational database server, e.g., a SQL processing engine, for further query and manipulation operations based on SQL statements. 0030 parses, interprets, and manages queries. Multidimensional database server further processes according to SQL statements.]; and

Submitting the constructed multidimensional database query for execution against a multidimensional data source [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement].

<u>**Claim 2:**</u>

As to claim 2, Solyemez discloses, the method of claim 1, further comprising:

Receiving, in response to submitting the multidimensional database query, a multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional

database server to extract the multidimensional data required by the relational database server to process the relational database statement]; and

Constructing a relational database query result based on the received multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement].

Claim 3:

As to claim 3, Solyemez discloses, **a method in a computing system for processing a relational database query comprising:**

Receiving the relational database query, the received relational database query being drawn against a relational model of a multidimensional data source [[0018] Techniques are provided for efficiently accessing multidimensional data using relational database statements, such as SQL commands.];

Using a relational-to-multidimensional mapping contained by the model together with relational/multidimensional equivalency logic to construct a multidimensional database query based on the received relational database query [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the

data resided in a relational table. [0045] At block 204, a subset of data is identified based on the query. For example, the multidimensional database server 106 (FIG. 1) identifies source data, i.e., a subset of data from the n-dimensional data cube (e.g., n-dimensional analytical workspace data objects), based on a table function. The table function may operate with one or more input parameters that specify (1) the name of the analytic workspace in which the source data (also referred to as data objects and data items) is stored; (2) the name of a virtual relational table that has been defined to organize the multidimensional data in tabular form; and (3) a mapping of the source data objects to target columns in the table]; and

Submitting the constructed multidimensional database query for execution against the modeled multidimensional data source [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement].

<u>**Claim 6:**</u>

The method of claim 3 wherein the relational query specifies a detail filter against the relational model, and wherein the constructed multidimensional query specifies that the detail filter be applied to the modeled multidimensional data source [0049].

<u>**Claim 7:**</u>

The method of claim 6 wherein the relational query is expressed in SQL, and wherein the detail filter specified by the relational query is an SQL WHERE clause [0054].

Claim 8:

The method of claim 3 wherein the relational query specifies an aggregation function against the relational model, and wherein the constructed multidimensional query specifies that the aggregation function be applied to the modeled multidimensional data source [0006, aggregate functions. 0052 multidimensional database server may determine which cells in the subset satisfy any cell-filtering criteria specified by the query.].

Claim 10:

The method of claim 3 wherein the relational query specifies a summary filter against the relational model, and wherein the constructed multidimensional query specifies a summary filter be applied to the modeled multidimensional data source [[0054] In one embodiment, at block 218 a subset of cells (e.g., a sub-cube) is identified, from the data subset, having cells that satisfy dimension-based cell-filtering criteria specified in the query. For example, based on information in the table function parameters (e.g., a LIMIT statement) or in a SQL WHERE clause, particular cells within the subset that are of interest to the query are identified based on dimension-based criteria. Thus, even though a subset of the n-dimensional objects has already been identified based on the table function, other portions of the database query might further limit the particular cells of interest within the subset].

<u>**Claim 15:**</u>

The method of claim 3, further comprising:

Receiving, in response to submitting the multidimensional database query, a multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement]; and

Using a relational-to-multidimensional mapping contained by the model together with relational/multidimensional equivalency logic to construct a relational database query result based on the received multidimensional database query result. a relational query result construction subsystem that uses a relational-to-multidimensional mapping contained by the model to construct a relational database query result based on the received multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement. 0074, an abstract table type (schema) can be defined in the relational database server to describe the virtual return table that is populated by the table function, which describes the "shape" of the result of the table function, e.g., essentially a mapping of source multidimensional data objects to target "rows" (e.g., abstract object types) and "columns" (e.g., attributes of the abstract object types) in the virtual return table (e.g., abstract table type as a collection of abstract object types).].

<u>Claim 17:</u>

The method of claim 3, further comprising making information about the model available for use in building the received relational database query [0018].

<u>Claim 18:</u>

The method of claim 3, further comprising:

Determining that the received relational database query is drawn against both the relational model of the multidimensional data source and one or more native relational tables [0018, accessing multidimensional data using relational database statements, such as SQL commands. To access the data a relational database statement is submitted to a relational database server. The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the statement.]; and

Constructing a native relational database query based on aspects of the received relational database query drawn against conventional relational tables [[0020] the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table.]; and

Submitting the native relational database query for execution against the conventional relational tables [0018, relational database query is made. 0020, relational database query is sent to virtual table],

And wherein the constructed multidimensional database query is based on aspects of the received relational database query drawn against the relational model of the multidimensional data source [[0020] the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table.].

Claim 19:

As **to claim 19, Soylemez discloses a computer-readable medium whose contents cause a computing system to process a relational database query by;**

Receiving the relational database query, the received relational database query being drawn against a relational model of a multidimensional data source [[0018] Techniques are provided for efficiently accessing multidimensional data using relational database statements, such as SQL commands.];

Using a relational-to-multidimensional mapping contained by the model to translate the received relational database query into a multidimensional database query [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. [0045] At block 204, a subset of data

is identified based on the query. For example, the multidimensional database server 106 (FIG. 1) identifies source data, i.e., a subset of data from the n-dimensional data cube (e.g., n-dimensional analytical workspace data objects), based on a table function. The table function may operate with one or more input parameters that specify (1) the name of the analytic workspace in which the source data (also referred to as data objects and data items) is stored; (2) the name of a virtual relational table that has been defined to organize the multidimensional data in tabular form; and (3) a mapping of the source data objects to target columns in the table]; and

Submitting the multidimensional database query for execution against the modeled multidimensional data source [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement].

<u>Claim 20:</u>

The computer-readable medium of claim 19, wherein the contents of the computer-readable medium further cause the computing system to:

Receive, in response to submitting the multidimensional database query, a multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional

database server to extract the multidimensional data required by the relational database server to process the relational database statement]; and

Use a relational-to-multidimensional mapping contained by the model to translate the received multidimensional database query result into a relational database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement. 0074, an abstract table type (schema) can be defined in the relational database server to describe the virtual return table that is populated by the table function, which describes the "shape" of the result of the table function, e.g., essentially a mapping of source multidimensional data objects to target "rows" (e.g., abstract object types) and "columns" (e.g., attributes of the abstract object types) in the virtual return table (e.g., abstract table type as a collection of abstract object types).].

Claim 21:

As to claim 21, a computing system for processing a relational database query, comprising;

A query reception subsystem that receives the relational database query, the received relational database query being drawn against a relational model of a multidimensional data source [[0018] Techniques are provided for efficiently accessing multidimensional data using relational database statements, such as SQL commands.];

A multidimensional query construction subsystem that uses a relational-to-multidimensional mapping contained by the model to construct a multidimensional database query based on the received relational database query [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. [0045] At block 204, a subset of data is identified based on the query. For example, the multidimensional database server 106 (FIG. 1) identifies source data, i.e., a subset of data from the n-dimensional data cube (e.g., n-dimensional analytical workspace data objects), based on a table function. The table function may operate with one or more input parameters that specify (1) the name of the analytic workspace in which the source data (also referred to as data objects and data items) is stored; (2) the name of a virtual relational table that has been defined to organize the multidimensional data in tabular form; and (3) a mapping of the source data objects to target columns in the table]; and

A query submission subsystem that submits the constructed multidimensional data source [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement].

Claim 22:

The computing system of claim of claim 21, further comprising:

a query result reception subsystem that receives, in response to submitting the multidimensional database query, a multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement]; and

a relational query result construction subsystem that uses a relational-to-multidimensional mapping contained by the model to construct a relational database query result based on the received multidimensional database query result [0018, The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the relational database statement. 0074, an abstract table type (schema) can be defined in the relational database server to describe the virtual return table that is populated by the table function, which describes the "shape" of the result of the table function, e.g., essentially a mapping of source multidimensional data objects to target "rows" (e.g., abstract object types) and "columns" (e.g., attributes of the abstract object types) in the virtual return table (e.g., abstract table type as a collection of abstract object types).].

Claim 23:

As to claim 23, **Soylemez** discloses one or more computer memories collectively containing a data source modeling data structure for use in modeling a multidimensional data source in a relational database environment, the data structure comprising:

a schema for one or more virtual relational tables each representing contents of the multidimensional data source [0074, specifies a particular "form" in which multidimensional data from the multidimensional schema is to be presented to the relational server according to the table function. 0030, During processing of a relational statement, relational database server 108 can request and receive a set of multidimensional data, such as virtual return table 107, from multidimensional database server 106 for further processing according to one or more SQL statements]; and

one or more mappings between schema components and contents of the multidimensional data source to which they correspond [0074, an abstract table type (schema) can be defined in the relational database server to describe the virtual return table that is populated by the table function, which describes the "shape" of the result of the table function, e.g., essentially a mapping of source multidimensional data objects to target "rows" (e.g., abstract object types) and "columns" (e.g., attributes of the abstract object types) in the virtual return table (e.g., abstract table type as a collection of abstract object types).],

such that the schemas contained by the data structure may be used to formulate relational queries against the virtual relational tables [0031, Such data and metadata may be stored in database 104 logically, for example, according to relational schema constructs. 0043, The result set from the table function is a virtual return table containing columns that can be joined to relational tables or views, or to other virtual return tables populated by another table function.],

and such that the schemas and mappings may be used to translate relational queries against the virtual relational tables into multidimensional queries against the multidimensional data source into relational query results from the virtual relational tables [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

<u>Claim 24:</u>

The computer memories of claim 23 wherein, in the multidimensional data source, a particular multidimensional level name occurs in both a first hierarchy of the multidimensional data source and a second hierarchy of the multidimensional data source that is distinct from the first hierarchy [[0047] In one embodiment, the table function has another input parameter that specifies a command, such as an OLAP DML (Data Manipulation Language) command, that may be used, for example, to limit one or more dimensions to a particular level of the dimension's hierarchical structure],

and wherein the schema for the virtual relational tables specify both a first column corresponding to the occurrence of the multidimensional level name in the first hierarchy and a second column corresponding to the occurrence of the multidimensional level name in the second hierarchy, the metadata for the first column specifying an external name that is the same as the multidimensional level name as well as an internal name, and the metadata for the second column specifying an external name that is the same as the multidimensional level name and an internal name that is distinct from the internal name specified for the first column [[0045] At block 204, a subset of data is identified based on the query. For example, the multidimensional database server 106 (FIG. 1) identifies source data, i.e., a subset of data from the n-dimensional data cube (e.g., n-dimensional analytical workspace data objects), based on a table function. The table function may operate with one or more input parameters that specify (1) the name of the analytic workspace in which the source data (also referred to as data objects and data items) is stored; (2) the name of a virtual relational table that has been defined to organize the multidimensional data in tabular form; and (3) a mapping of the source data objects to target columns in the table. Therefore, from these parameters the multidimensional database server identifies a subset of the multidimensional data, i.e., a subset of the n-dimensional data objects, prior to fetching the source data from the analytic workspace. For example, the subset may be identified based on the specification of dimension a, dimension b, and dimension c in the limit map].

__Claim 25:__

The computer memories of claim 23 wherein the data structure further comprises, for each of a plurality of members of the multidimensional data source, metadata identifying an aggregation rule applied to the measure in a multidimensional database environment in which the modeled multidimensional data source resides [[0031] data and metadata may be stored in database 104 logically, for example, according to relational schema constructs, multidimensional schema constructs, or a combination of relational and multidimensional schema constructs. Database 104 comprises a multidimensional schema for storing data for one or more multidimensional cubes 110, an abstract data construct that represents multidimensional data. As mentioned, data that is organized by two or more dimensions is referred to as multidimensional data].

<u>Claim 26:</u>

One or more computer memories collectively containing a database-type transparency data structure for use in modeling a plurality of multidimensional data source in relational database environment, the data structure comprising:

for each of the multidimensional data sources, individual source information comprising:

information defining one or more corresponding virtual relational tables [0042, The specified columns of the virtual return table include those columns that are specified as targets in a parameter of the table function. The conditions modify the result set from the table function. The conditions are processed by either the multidimensional database server 106 or the relational database server 108, depending on the associated operators.], and

information mapping between components of the virtual relational tables and contents of the multidimensional data source [0045, the name of a virtual relational table that has been defined to organize the multidimensional data in tabular form]; and

a single body of relational/multidimensional equivalency logic that may be used to translate a relational query against one or more of the virtual relational tables defined the individual source information for selected multidimensional data sources into a multidimensional query against the selected multidimensional data sources with reference to the individual source information for the selected multidimensional data sources [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

Claim 27:

One or more computer memories collectively containing a data structure constituting a multidimensional database query against a multidimensional data source, the data

structure comprising contents generated by analyzing a relational database query issued against virtual relational tables that model the multidimensional data source,

> **Such that the contents of the data structure may be used to execute the multidimensional database query** [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

<u>Claim 28:</u>

One or more generated data signals collectively conveying a data structure constituting a multidimensional database query against a multidimensional data source, the data structure comprising contents generated by analyzing a relational database query issued against a relational model of the multidimensional data source,

Such that the contents of the data structure may be used to execute the multidimensional database query [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

<u>Claim 29:</u>

One or more computer memories collectively containing a relational database query result data structure, the data structure comprising contents relating to relational tables that model a multidimensional data source, and generated by analyzing a multidimensional database query result produced from the multidimensional data source [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated

with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

Claim 30:

One or more generated signals collectively conveying a relational database query result data structure, the data structure comprising contents relating to relational tables that model a multidimensional data source, and generated by analyzing a multidimensional database query result produced from the multidimensional data source [[0020] According to one aspect of the invention, the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. In one embodiment, information about how to structure a virtual table associated with results from a table function is included in the relational database statement, and communicated from the relational database server to the multidimensional database server. In addition, the multidimensional database server may dynamically generates definitions of the types within the virtual return table, and communicates the definitions to the relational database server to enable the relational database server to access the multidimensional data within the virtual return table.].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 (hereafter Soylemez) as applied to claim 1-3, 6-7, 8, 10, 15, 17-18, 19-30 above, and further in view of U.S. Patent Application Publication 20020124002 by Su et. al. (hereafter Su).

<u>Claim 4:</u>

The method of claim 3 wherein the multidimensional query is constructed in MDX.

Soylemez does not explicitly disclose wherein the multidimensional query is constructed in MDX. However, Su discloses the use of MDX on a multidimensional data source [0086, 0121]. Both inventions are directed to database systems. It would have been obvious to one of ordinary skill in the art to modified Solyemez to have included the step of wherein the multidimensional query is constructed in MDX. A skilled artisan would have been motivated to do so for the purpose of being able to talk to the multidimensional data source in a language it would understand. It is further well known in the art that MDX is a standard multidimensional database query language.

Claim 5:

The method of claim 4 wherein the relational query is expressed in SQL [0018].

Claims 12-13, 16, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 by Soylemez (hereafter Soylemez) as applied to claim 1-3, 6-7, 8, 10, 15, 17-18, 19-30 above, and further in view of U.S. Patent Application Publication 20020087516 by Cras et. al. (hereafter Cras).

Claim 12:

The method of the claim 3 **wherein the relational query specifies a detail filter against the relational model having selected predicates** [0062], and

However, Solyemez does not explicitly disclose wherein the constructed multidimensional query specifies, for each of the selected predicates that can be applied against the modeled multidimensional data source before a crossjoin operation is performed, applying the selected predicate against the modeled multidimensional data source as early as possible. On the other hand, Cras discloses, [0019] a Relational Database Management System (RDBMS) having any arbitrary structure is translated into a multi-dimensional data model suitable for performing OLAP operations upon. If a relational table defining the relational model includes any tables with cardinality of 1,1 or 0,1, the tables are merged into a single table according to the present invention. Both

inventions are in the same field of endeavor. That is, database systems and in particular multidimensional databases. It would have been obvious to one of ordinary skill in the art to have modified Soylemez to have included **wherein the constructed multidimensional query specifies, for each of the selected predicates that can be applied against the modeled multidimensional data source before a crossjoin operation is performed, applying the selected predicate against the modeled multidimensional data source as early as possible** based on the disclosure of Cras. A skilled artisan would have been motivated to do so for the purpose of obtaining data from a multidimensional data structure and combining it with a relational structure.

<u>Claim 13:</u>

The method of claim 3 wherein **the relational query specifies a detail filter against the relational model having selected predicates** [0062]. However Solyemez does not explicitly disclose wherein the constructed multidimensional query specifies, for each of the selected predicates that can be applied against the modeled multidimensional data source before a crossjoin operation is performed, applying the selected predicate against the modeled multidimensional data source before a crossjoin operation is performed. On the other hand, Cras discloses, [0019] a Relational Database Management System (RDBMS) having any arbitrary structure is translated into a multi-dimensional data model suitable for performing OLAP operations upon. If a relational table defining the relational model includes any tables with cardinality of 1,1 or 0,1, the tables are merged into a single table according to the present invention. Both inventions are in the same field of endeavor. That is, database systems and in

particular multidimensional databases. It would have been obvious to one of ordinary skill in the art to have modified Soylemez to have included **wherein the constructed multidimensional query specifies, for each of the selected predicates that can be applied against the modeled multidimensional data source before a crossjoin operation is performed, applying the selected predicate against the modeled multidimensional data source before a crossjoin operation is performed** based on the disclosure of Cras. A skilled artisan would have been motivated to do so for the purpose of obtaining data from a multidimensional data structure and combining it with a relational structure.

<u>**Claim 16:**</u>

The method of claim 3, further comprising:

> **Determining that the received relational database query is drawn against both the relational model of the multidimensional data source and one or more native relational tables**[0018, accessing multidimensional data using relational database statements, such as SQL commands. To access the data a relational database statement is submitted to a relational database server. The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the statement.]; and
>
> **Constructing a native relational database query based on aspects of the received relational database query drawn against conventional relational tables** [[0020] the

multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table.]; and

Submitting the native relational database query for execution against the conventional relational tables[0018, relational database query is made. 0020, relational database query is sent to virtual table]; and

And wherein the constructed multidimensional database query is based on aspects of the received relational database query drawn against the relational model of the multidimensional data source, the method further comprising:

Receiving, in response to submitting the native relational database query, a native relational database query result[[0020] the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table.**].**

However Soylemez does not explicitly disclose **combining the constructed relational database query result with the received native relational database query result in accordance with the received relational database query.**

On the other hand, Cras discloses, [0019] a Relational Database Management System (RDBMS) having any arbitrary structure is translated into a multi-dimensional data model suitable for performing OLAP operations upon. If a relational table defining the relational model includes any tables with cardinality of 1,1 or 0,1, the tables are merged into a single table according to the present invention. Both inventions are in the same field of endeavor. That is, database systems and in particular multidimensional databases. It would have been obvious to one of ordinary skill in the art to have modified Soylemez to have included the steps combining contents of a first search result produced in response to the native relational database query and a second search result produced in response to the multidimensional database query into a third search result responsive to the received relational database query based on the disclosure of Cras. A skilled artisan would have been motivated to do so for the purpose of obtaining data from a multidimensional data structure and combining it with a relational structure.

Claim 31:

A method in a computing system for processing a relational database query, comprising:

Receiving the relational database query, the received relational database query being drawn against both a relational model of a multidimensional data source and a native relational table [0018, accessing multidimensional data using relational database statements, such as SQL commands. To access the data a relational database

statement is submitted to a relational database server. The relational database server communicates with the multidimensional database server to cause the multidimensional database server to extract the multidimensional data required by the relational database server to process the statement.];

Converting the received relational database query into (1) a native relational database query against only the native relational table, and (2) a multidimensional database query against the multidimensional data source [[0020] the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table.];

submitting the a native relational database query against the native relational table [0018, relational database query is made. 0020, relational database query is sent to virtual table];

submitting the multidimensional database query against the multidimensional data source [0020, multidimensional database server places extracted multidimensional data into a relational structure.]; and

However Soylemez does not explicitly disclose combining contents of a first search result produced in response to the native relational database query and a second search result produced in response to the multidimensional database query into a third search result responsive to the received relational database query.

On the other hand, Cras discloses, [0019] a Relational Database Management System (RDBMS) having any arbitrary structure is translated into a multi-dimensional data model suitable for performing OLAP operations upon. If a relational table defining the relational model includes any tables with cardinality of 1,1 or 0,1, the tables are **merged** into a single table according to the present invention. Both inventions are in the same field of endeavor. That is, database systems and in particular multidimensional databases. It would have been obvious to one of ordinary skill in the art to have modified Soylemez to have included the steps combining contents of a first search result produced in response to the native relational database query and a second search result produced in response to the multidimensional database query into a third search result responsive to the received relational database query based on the disclosure of Cras. A skilled artisan would have been motivated to do so for the purpose of obtaining data from a multidimensional data structure and combining it with a relational structure.

Claims 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 by Soylemez (hereafter Soylemez) as applied to claim 1-3, 6-7, 8, 10, 15, 17-18, 19-30 above, and further in

view of U.S. Patent application publication 2005/0004904 with provisional filing date of 5/7/2003 by Keamey (hereafter Keamey).

__Claim 14:__

The method of claim 3 wherein the relational query specifies performing a selected aggregation function on a selected column of a virtual relational table, the virtual relational table corresponding to a multidimensional data source, the selected column corresponding to a selected measure of the multidimensional data source, the method further comprising:

Soylemez does not explicitly disclose retrieving metadata identifying an aggregation function used for the selected measure of the multidimensional data source;

However, Keamey discloses **retrieving identifying aggregation functions used for the selected measure of the multidimensional cube** [abstract, specifies operations according to criteria. 0054 discloses operations are aggregate functions.]. Both inventions are directed towards the same field of endeavor. That is database systems, and in particular multidimensional database systems. It would have been obvious to one of ordinary skill in the art to have modified Soylemez to have included the step of **retrieving identifying aggregation functions used for the selected measure of the multidimensional cube** based on the disclosure of Keamey. A skilled artisan would have been motivated to for the purpose of describing the correct operation to enact.

Determining whether the aggregation function identified by the metadata matches the selected aggregation function [Keamey, Abstract, para. 30-31, matches specified criteria to determine requested operation.]; and

If the aggregation function identified by the metadata matches the selected aggregation function, generating a multidimensional query against the multidimensional data source that relies on the aggregation function performed in the multidimensional data source that relies on the aggregation function performed in the multidimensional data source [Keamey, abstract, performs requested operation.].

Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent application publication 2005/0004904 with provisional filing date of 5/7/2003 by Keamey (hereafter Keamey) further in view of U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 by Soylemez (hereafter Soylemez)).

<u>Claim 32:</u>

A method in a computing system for generating a multidimensional query comprising:

Keamey discloses **retrieving identifying aggregation functions used for the selected measure of the multidimensional cube** [abstract, 0054, operations can be aggregations].

Determining whether the aggregation function identified by the metadata matches the selected aggregation function [Keamey, Abstract, para. 30-31, 54, matches specified criteria to determine requested operation.]; and

If the aggregation function identified by the metadata matches the selected aggregation function, generating a multidimensional query against the multidimensional cube that relies on the aggregation function performed in the multidimensional cube [Keamey, abstract, performs requested operation.].

Keamey discloses **receiving a relational query that specifies a selected aggregation function** [abstract, performs requested operation on data according to specified expression.]. However Keamey does not explicitly disclose on **a selected column of a virtual relational table, the virtual relational table corresponding to a multidimensional cube, the selected column corresponding to a selected measure of the multidimensional cube**. On the other hand, Soylemez discloses a 0020, that the multidimensional database server places the extracted multidimensional data in a relational structure, referred to herein as the "virtual return table", to enable the relational database server to access and manipulate the data as if the data resided in a relational table. Both inventions are directed towards the same field of endeavor. Mainly database systems and further multidimensional database systems. It would have been obvious to one of ordinary skill to have modified Keamey to have included the step of a selected column of a virtual relational table corresponding to a multidimensional cube, the selected column corresponding to a selected measure of the multidimensional cube

based on the disclosure of Soylemez. A skilled artisan would have been motivated to do so for the purpose of associating results with a relational structure.

Claim 33:

The method of claim 32 wherein the multidimensional query is generated only if the relational query does not specify a filter referencing levels of the multidimensional cube that are below a level of aggregation specified by the relational query [Keamey, Abstract, para. 30-31, 54, matches specified criteria to determine requested operation.].

Claim 34:

The method of claim 32 wherein the generated query doe not specify performing in order to perform the selected aggregation function [Keamey, Abstract, para. 30-31, 54, matches specified criteria to determine requested operation.].

Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent application publication 2004/0236767 with provisional filing date of 5/7/2003 by Soylemez (hereafter Soylemez) as applied to claim1-3, 6-7, 8, 10, 15, 17-18, 19-30 above, and further in view of "Database Systems: The complete book" by Hector Garcia-Molina (hereafter Garcia-Molina).

Claim 9:

As to claim 9, Soylemez discloses the method of claim 8 **wherein the relational query is expressed in SQL** [0018]; and further discloses, 0052, determining cell filtering based on Query, wherein cell values are associated with types of data on which a function is executed, such as a summation, average, minimum value, maximum value, and the like [0006] (i.e. **aggregation function specified by relational query**). However Soylemez does not explicitly (this is an obvious function in SQL) disclose wherein the aggregation function specified by the relational query **is an SQL GROUP BY clause**.

On the other hand, Garcia-Molina discloses that SQL supports grouping, by using a GROUP BY clause [pages 277, 282]. Both references are in the same field of endeavor, databases. Furthermore, both disclose relational databases that utilize SQL. It would have been obvious to have modified Solyemez to have included an SQL GROUP BY clause based on the disclosure of Gracia-Molina. A skilled artisan would have been motivated to do so for the purpose of grouping tuples together. One of ordinary skill in the art would know this would be a form of filtering.

Claim 11:

The method of claim 10 wherein the relational query is expressed in SQL [0018], **and wherein the summary filter specified by the relational query**[[0054] In one embodiment, at block 218 a subset of cells (e.g., a sub-cube) is identified, from the data subset, having cells that satisfy dimension-based cell-filtering criteria specified in the query. For example, based on information in the table function parameters (e.g., a LIMIT statement) or in a SQL WHERE

clause, particular cells within the subset that are of interest to the query are identified based on dimension-based criteria. Thus, even though a subset of the n-dimensional objects has already been identified based on the table function, other portions of the database query might further limit the particular cells of interest within the subset]. However, Soylemez does not explicitly disclose **is an SQL HAVING clause**.

On the other hand, Garcia-Molina discloses that SQL supports grouping, by using a HAVING clause, (pages 277, 282). Both references are in the same field of endeavor, databases. Furthermore, both disclose relational databases that utilize SQL. It would have been obvious to have modified Solyemez to have included an SQL HAVING clause based on the disclosure of Gracia-Molina. A skilled artisan would have been motivated to do so for the purpose of grouping tuples together. One of ordinary skill in the art would know this would be a form of filtering.

Conclusion

The prior art made of record listed on PTO-892 and not relied, if any, upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael D. Pham whose telephone number is (571)272-3924. The examiner can normally be reached on Monday - Friday 9am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on 571-272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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